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INTERNATIONAL COOPERATION IN THE FIELD OF INFORMATICS

Note by the Secretary-General

1. At its second regular session of 1990, the Economic and Social Council considered the question of international cooperation in the field of informatics on the basis of a note by the Secretary-General transmitting a report prepared by the United Nations Educational, Scientific and Cultural Organization (UNESCO) in consultation with the International Telecommunication Union (ITU) and the United Nations Industrial Development Organization (UNIDO). By resolution 1990/58, the Council recommended that international organizations, in particular UNESCO, UNIDO and ITU, continue to increase their efforts and activities in the field of informatics; called upon Member States to encourage and promote activities to expand the endogenous skills of their population in the field of informatics; and requested the Secretary-General to prepare a report on all aspects of international cooperation in the field of informatics for submission to the Council at its second regular session of 1991.

2. In response to that request, the Secretary-General has the honour to transmit herewith to the Economic and Social Council the follow-up report prepared by UNESCO.

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* E/1991/100.

Annex

FOLLOW-UP REPORT ON INTERNATIONAL COOPERATION IN THE FIELD OF INFORMATICS PREPARED BY THE UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION

1. At its second regular session of 1990, the Economic and Social Council discussed international cooperation in the field of informatics. The discussion, which was based on document E/1990/86, led to the adoption of resolution 1990/58, in which the Council requested the Secretary-General to prepare a report on all aspects of international cooperation in the field of informatics and the impact of informatics on the economic growth and development of the developing countries, including concrete recommendations for intensifying and strengthening international cooperation in that field in the context of the revitalization of economic growth and development of the developing countries, for submission to the Economic and Social Council at its second regular session of 1991.

2. The present report responds to that request and describes steps that have been taken, since the adoption of the resolution, with regard to international cooperation in the field of informatics, along the lines emphasized by the Council. In particular, the report endeavours to provide information on the activities undertaken by UNESCO with a view to reinforcing international cooperation in the field of informatics and providing a basis for adequate development and utilization of informatics in developing countries.

Contribution of informatics to technological upheaval

3. Over the past 20 years, there has been an unprecedented surge of activity in science and technology. New technologies have been developed in such varied sectors as the biosciences and biotechnology, microelectronics, renewable sources of energy, aviation and space, composite materials and so on. It is this volume of discoveries and, above all, their almost immediate technological application that make the surge of activities different from anything the world has previously experienced.

4. Informatics is an essential component of this revolution due to the role it plays in the acquisition, processing and communication of information indispensable to the development of know-how and knowledge. Few activities in today's world have been unaffected by this development. Informatics alters first the economic and then the political stakes, both within individual countries and in the relationship between countries, by setting its seal on a new balance of power. This already observable phenomenon becomes increasingly marked as time goes on and new developments emerge, pushing to the sidelines individuals and societies which, for one reason or another, have been unable to take the necessary measures to enable them to master and assimilate informatics and to apply it to their development.

5. There is every reason to believe that informatics is contributing to an upheaval comparable to technological revolutions like the agrarian revolution and industrial revolution already experienced by mankind, and which profoundly marked the period during which they occurred. Undoubtedly one of the most eloquent signs of this is the establishment witnessed today, of a planet-wide information and communication network based on the linking of computers with telecommunications, opening immense prospects for human relations. This amounts to a veritable explosion of new possibilities extending to every field of social activity and its effects are yet to be properly comprehended. Though a silent upheaval, none the less, it has the potential of being as radical as the invention of writing by the extension it provides for our memory, the transformation it is making in our information systems, the enhancement it is according our intellectual capacity and by the modifications that it heralds in our modes of organization and communication.

6. A principal challenge for the years ahead within the context of the accepted goal of peaceful coexistence will be to harmonize the realities of independent countries on the one hand and interdependent efforts and programmes on the other, in such a manner that peaceful cooperative interaction dedicated to the principles of equity and social justice for all becomes possible and effective. In this context, the area of international cooperation in informatics deserves special attention in view of the increasing interdependence and important transnational interactions in all phases of the field.

7. While it is evident that some nations are far ahead of others, informatics is nevertheless a developing domain. Thus, since it can be said that all nations are developing by virtue of the widely expanding applications and the dynamics of the state-of-the-art in this domain, there is an obvious value in cooperation and mutual exchanges of experience, know-how and technical information. In addition, the special needs of technical assistance to, and cooperation with and among, the less developed countries is of great urgency if they are also to profit from the contribution of informatics to their development. Finally, there are the areas of standardization, collaborative research and development, education and training, technology transfer and acquisition, joint undertakings and exchange of information, in which international cooperation is deemed essential to assist in orderly and effective development for the common good.

8. In its role as a vector of development, informatics might have provided the developing countries with a means of improving and bringing down the cost of resources management making the most of their potential and increasing their economic ouput, as in the industrialized countries. This occurred in only few cases, however.

9. Just as informatics has been assimilated and integrated into the development process in the industrialized countries, so it seems that most of the developing countries have been unable to exploit its capacity owing to both paucity of resources and shortage of qualified personnel. It is quite clear that in default of action, this situation may worsen still further in

the near future, as may be seen from the growing lead taken by the industrialized countries in the field of computer and telecommunication technologies.

10. These prospects necessarily compound the concern caused by the impact of technological development on economic imbalances. It is vitally urgent to remedy this situation by large-scale practical and effective action. Launched by the United Nations, action should be of a kind to interest and involve not only Governments but also governmental and non-governmental international organizations as well as producers of technology. The decisions to be taken with a view to reviving international cooperation in the field of informatics and its attendant technologies should be based on past experience, present-day reality, the importance of the issues at stake, the economic situation and its resulting power relationships.

Impact, trend and challenges

11. The economic impact of informatics is regarded as positive, given the condition of the rational exploitation of its potentiality. Informatics technology is becoming the driving force behind productivity. Its appropriate, or inappropriate, use has serious repercussions on the competitiveness of agriculture and industry, the efficacy of the tertiary sector, the cost and quality of education, defence potential and the ability to innovate in both the economic and the social fields.

12. Informatics provides an instrument for the modelling, design, development and management of technical and research projects of growing scope and complexity. It is also instrumental in the operation of complex interactive networks within a given society or among several countries. It thus gives rise to structural changes, not only in the production and service sectors and in their corresponding job structures, but also in the conditions governing the activity of these sectors.

13. The effects of advanced technologies, especially informatics, on the social and cultural context are subjects for concern in nearly all countries. Taken in conjunction, the technologies of information, telecommunications and of audio-visual communication all raise the problem for society as a whole of preserving the diversity of cultures and the advantages of intercultural dialogue and, for the individual, that of preserving the benefits of conviviality in the family and in different social gruops.

14. The early realization by the industrialized countries of the economic consequences of the use of informatics is reflected in its widespread use in these countries, where the value of the computer population has attained or exceeds 2 per cent of their gross national product: 95 per cent of all installed computers are to be found in those countries, compared with 3.3 per cent in Latin America, 1.6 per cent in Asia and less than 0.5 per cent in Africa.

15. This realization also took place in many developing countries, but at a much later date. In addition, in a number of these countries, it proved impossible to develop informatics owing to the inadequacy of human and material resources, the existence of other essential priorities, the weakness of the production and management activities that create a demand for data processing, the poor standard of telecommunications equipment, the lack of the appropriate scientific and technological environment and of the structures and skills needed for large-scale action to train specialists or users.

16. In a market dominated by a small number of firms, the industrialized countries that were technology exporters made great efforts, either individually or in cooperation, to strengthen the research and development and industrial production sectors, including informatics-related services. These countries then attained a high degree of mastery in the preparation of software programmes, and acquired a substantial industrial capacity, even if they were still backward in certain types of advanced technology.

17. A small number of developing countries managed to acquire industrial expertise, either through subcontracting or as a result of a political decision. In other countries, informatics products (hardware, supplies and sometimes software application programmes) are generally imported. This situation is aggravated by insufficient joint planning and cooperation among the developing countries themselves.

18. Imbalances in the master of informatics technologies and their dissemination occur not only between the industrialized and the developing countries but also between groups of countries both in the North and in the South, and sometimes among the different sectors of economic activity within a single country.

19. The conviction that the information technologies were the leaven of a metamorphosis of civilization was strengthened by the observation of many measurable phenomena. All human activities are now concerned by societies' capabilities to convert, process, stock and communicate information, linked with the progress of electronics, telecommunications and informatics. The productivity of labour, the organization of government, different modes of consumption, education, morals and culture are being transformed. What is involved is not only the birth of a society of information and communication but also the advent of a civilization of knowledge, which brings with it new skills, new ways of teaching them and new patterns of behaviour.

20. The abrupt leap forward caused by informatics has only widened the gap between those who are the most advanced and those who are the most deprived, with the result that, in a world that is becoming more and more heterogeneous, a large number of intermediary situations may be observed:

> Regions which have remained at the stage of an economy based on agriculture and crafts, frequently with raw materials as their only source of wealth: these comprise the developing countries;

Other regions whose state of development and outlook have long since brought them into the industrial era;

A few countries constituting highly favoured areas of development, in which the most sophisticated technologies emerge and flourish and in which practically all the means of producing these new technologies are also concentrated.

21. Some figures of magnitude should be borne in mind to gain a proper understanding of the scope of the problems to be tackled.

22. Of all expenditure on informatics and information technolgies in general, 95 per cent is incurred in the industrialized countries and barely 5 per cent in the developing countries. This corresponds to the following approximate geographical distrilution of production:

North America	Some 40 per cent
Western Europe	20 to 25 per cent
Japan and newly industrialized South-East Asian countries	20 to 25 per cent
The rest of the world	20 per cent

23. The investments envisaged for the 1990s give a further idea of the size of the phenomenon:

	Thousands of United States dollars
World turnover figures for the producer industries and activities directly connected with information technologies	1 000 million
Evaluation of annual research and development activities	50 million
Evaluation of annual investments in new software	50 million

24. The gaps noted at the production level are naturally reflected at the investment level. The industrialized countries devote between 3 per cent and 5 per cent of their GNP to informatics facilities, compared with less than 1 per cent for the developing countries. These gaps are accentuated by the fact that the cost of information is higher in the developing countries than in the advanced countries.

Place of informatics in UNESCO

25. Informatics has been given high visibility in the new Sector for Communication, Information and Informatics (CII) established in September 1990

to take account of the growing convergence of the three programme areas closely involved in the development and application of information technology. In this structural change, the unit responsible for informatics, which also serves as the secretariat of the Intergovernmental Informatics Programme (IIP), has been brought up to the level of a division, and its staff almost doubled. In addition, an Intersectoral Committee on Informatics has been established for the coordination of informatics activities within the framework of the programmes of UNESCO, since its informatics activities are undertaken in all areas of its competence. The Intersectoral Committee, chaired by the Deputy Director-General for Programme and serviced by the secretariat of IIP, aims, therefore, at streamlining actions, promoting collaboration among programmes and avoiding duplication of effort.

26. This high visibility is confirmed in the draft programme and budget for 1992-1993 to be examined by the General Conference of UNESCO at its twenty-sixth session in October/November 1991, where informatics is presented as a fully fledged programme, essentially focusing on human resources development, with an increase of 60 per cent in regular budget allocation compared with the previous biennial exercise.

Recent UNESCO activities in the field of informatics

27. Within the framework of UNESCO's regular programme and budget, training activities have been accorded high priority. Training courses on teleinformatics, sofware engineering, expert systems and articifial intelligence were organized in Europe to respond to the requirement of updating of knowledge. In terms of acquisition of knowledge, long-term training courses were actively supported in the developing countries. Falling within these categories of training courses are two university postgraduate training courses and two professional training courses supported in the Africa region, one postgraduate diploma course supported in the Arab region, and one high-level training course in the Latin America and Caribbean region. Training was also provided in terms of workshops and seminars, such as a workshop entitled "Informatics in the Management of Education and Research Activities" and an international seminar entitled "Practical Computer-aided Decision-making Systems", both organized in the Asia region. Some study grants were awarded to young graduates, including women, to enable them to undertake specialized studies in informatics.

28. With regard to the dissemination and exchange of information on informatics, support was given to regional newsletters and to an international journal, Information Technology for Development, which serves as an exchange forum between informaticians from developing countries on the one hand, and their counterparts from developed countries on the other. Cooperation was continued, especially with the International Federation for Information Processing (IFIP), which organized the Fifth World Conference on Computers in Education (WCCE/90) in Australia and an international workshop entitled "Informatics Curricula for the 90's" in the United States of America, both with the support of UNESCO.

29. Informatics activities were also carried out within the framework of Priority Africa. This is a special programme of UNESCO aimed at contributing to development in Africa. It is the subject of resolution 27 adopted by the UNESCO General Conference at its twenty-fifth session, in November 1989. The programme comprises a series of innovative activities designed to develop the national capacities of African member States. To this end, its major goal is to give effect to the main lines of action of the United Nations Programme of Action for African Economic Recovery and Development 1986-1990, adopted in June 1986. As a special programme it seeks essentially to help African countries to overcome difficulties of an economic, social and cultural nature through the promotion of international, regional and subregional cooperation.

30. Informafrica, which is the contraction of "Informatics and Africa", is the name given to the project designed in the field of of informatics within the framework of Priority Africa. The project is aimed at contributing to the development of informatics and its rational utilization in the development of the region, essentially by spreading informatics education to schools, post-school education and higher education, so that informatics becomes part of literate culture in the region.

31. To launch the project, an Informafrica Seminar was held at Lomé, Togo, from 3 to 7 December 1990. Organized in cooperation with the Agency for Cultural and Technical Cooperation (ACCT), and with the collaboration of the University of Benin, at Lomé, the seminar, in addition to discussing the policy and strategy of integrating informatics into general education, examined in great detail the following three aspects: informatics as a subject to be taught and learnt; informatics as a teaching aid; and informatics as a tool for management. As the participants saw it, the final report of the seminar should form the basis for a regional programme of action ensuring a coherent effort of cooperation among African member States and between them and the international community. The Informafrica Seminar was attended by delegates from 37 African member States, two intergovernmental organizations, two non-governmental organizations, four educational institutions, two private institutions, a multilateral financing agency, and 19 experts invited by UNESCO and ACCT. For its part, UNESCO has earmarked for Informafrica an amount of $US 850,000 in its draft programme and budget for 1992-1993. It will be used for catalytic actions aimed at the implementation of the programme and for the mobilization of complementary extrabudgetary funding.

Intergovernmental Informatics Programme (IIP)

32. Reinforcement of regional capacities in informatics and assistance towards formulation of national policies and strategies constitute the main focus of the Intergovernmental Informatics Programme, whose projects are financed from voluntary contributions and funds-in-trust provided by member States and, to a lesser degree, from UNESCO's regular budget. Within this framework, the implementation of major regional informatics projects, including the creation of regional academic networks, were given priority. Projects undergoing execution in differnet regions of the world are as follows:

Latin America and the Caribbean

Development and production of courseware in the Spanish-speaking countries of South America. This project is based in Peru.

Establishment of an information network on educational software. The project is based in Argentina.

Establishment of a regional informatics training centre for teachers of engineering and architecture based in Cuba.

Formulation of a national informatics policy undertaken in Uruguay.

Africa

Establishment of a postgraduate training course in informatics applied to water sciences in the Institut Inter-Etats d'Ingénieurs de l'Equipement Rural (EIER). The project is based in Burkina Faso.

Computer Software for Teaching of Science and Technology in Secondary Schools. The project, which is based in Nigeria, is associated with the one in Côte d'Ivoire.

Software production for science and technology teaching. The project, which is based in Côte d'Ivoire, is associated with the one in Nigeria.

Training course for computer engineers at ENSUT. The project is based in Senegal.

Training in microcomputer maintenance. The project is based in Togo.

Asia

Establishment of cooperative centres for out-of-school informatics training. The project is based in China.

Network experiment between India, Mongolia and Nepal. The project is based in India.

Arab States

Setting up of a mobile microcomputer facility for remote areas. The project is based in Jordan.

Strengthening of the regional scientific and technological information network (ASTINET) among Arab States. Its base is the UNESCO Regional Office for Science and Technology in the Arab States, Cairo.

Europe

International training and consultancy centre for informatics. This is based in the USSR.

33. Another set of projects approved in March 1991 by the Bureau of IIP for financing is listed in the appendix below. There are other projects submitted to IIP awaiting financial resources for execution. This is why IIP is continuously making appeals for further voluntary contributions from member States.

34. In addition to the execution of major projects in the regions, IIP has strengthened its contact world wide by establishing a network of focal points. The role of the focal points is essentially to generate dynamics of regional cooperation between the same region, and provide an active interface between the country and IIP with regard to specialized informatics institutions, needs and potentials of the different countries. Seventy-three national focal points have been designated so far by the various member States and have been receiving regular information on IIP activities.

Need and framework for international cooperation and coordination

35. Over a decade after the SPIN Conference, and despite the efforts made, there are still no answers to many of the problems raised. It should not, however, be inferred that the balance sheet of international cooperation is entirely negative. Some progress has been made, especially as regards awareness of the problem, since there is no longer any doubt as to the very close relationship between informatics and development. It is true that mistakes have been made, the greatest of which was probably that of giving priority to equipment and importing ready-made solutions to the problem of trained personnel, the only source of lasting progress.

36. The main objective today, more than ever before, is the constitution of endogenous potential through the development of existing skills. The main industrialized countries have practically attained this objective. Admittedly it should be stressed that for purely economic, or sometimes political and economic reasons, they succeeded in pooling their resources. Whether in the West or in the East, the European countries united their efforts to undertake large-scale informatics projects, for in such a complex field of activity only a very few countries can expect to manage on their own. Examples in Western Europe are the Eureka and Esprit projects, and in the Eastern European countries the projects being developed in the framework of the Council for Mutual Economic Assistance (CMEA), not to mention the varied technological exchanges between multinational corporations and within certain highly industrialized societies such as Japan and the United States of America.

37. For their part, the developing countries, faced with all sorts of problems, have to cope with a present situation fraught with difficulties and prepare for a future whose outlines are often uncertain. Only international cooperation can lead to positive developments.

38. One obvious fact needs to be emphasized again: the world is interconnected, the fate of each individual is the fate of all. Those who share a common destiny must have recourse to solidarity, which takes the practical form of cooperation. Cooperation is then the equivalent of peace. That is the meaning of the Mexico City Declaration, signed by a large number of heads of State and Government.

39. Properly used, informatics can provide opportunities for those who have mastered it. The enormous demographic growth of the South calls for a technical and organizational revolution in the production and distribution of wealth. Mastery of the new technologies can make young people the real source of wealth, in both the North and the South. The developing countries, whose human potential has increased in number and gained knowledge and experience, have the possibility of using informatics as a short cut towards economic development and greater well-being in a world in which competition has inescapably to be reckoned with.

40. Experience has shown that international cooperation in informatics, as in fact is the case in other areas, calls for a universal framework. All countries, large or small, rich or poor, industrialized or developing, must participate in action and reflection. However, nothing can be done, or well done, without the participation of the industrialized countries, which have a mastery of informatics and conduct a profitable trade in it.

41. In addition, the effort of cooperation cannot replace a national effort; it must accompany it, promote it and make it succeed.

42. This being the case, the United Nations framework appears to be the most appropriate one from which to launch international cooperation in informatics. Given the multidisciplinary nature of informatics and the experience gained from the efforts of IIP it is clear that inter-agency cooperation is the key to the development dissemination of informatics technologies.

43. Three organizations are more specially concerned than the others by the development of the new technologies in general:

UNESCO with regard to training, research and innovation;

ITU with regard to the development of telecommunications;

UNIDO with regard to the establishment of industrial processes.

44. The other organizations are users, developers and promoters of informatics specific to them which are of interest to member States.

45. A first step might be substantially to reinforce the means allocated to cooperation in each of the organizations dealing with informatics and its associated technologies.

46. In this process the role of UNESCO would be primordial, since UNESCO takes action at an earlier stage than the others: there is a universal need for specialists trained to undertake tasks and researchers equally well trained and equipped to make innovations. The work of training must be carried out as part of school and university curricula. Once they have personnel trained in informatics, the developing countries will be able to take action in important areas such as systems maintenance, the production of software and the development of new applications.

47. In countries with a need and potential, action in the hardware and software industry would be coordinated within UNIDO, whose special field this is. The revolution caused by the introduction of personal computers into daily life, especially the workplace, has opened up a different educational dimension. Through the organization of seminars, workshops and study tours, industrialists can be made aware of the role informatics would play in their working environment. UNIDO assists developing countries: through the application of informatics in promoting its use in many technical assistance projects dealing with industrial processing. One of the most common methods is the use of CAD/CAM systems. By providing access to the information resources, including informatics technology by developing and maintaining UNIDO information systems, the UNIDO technology information group is making its presence felt, not only in developing countries, but in industrialized ones as well. INTIB, TIES and the like are just examples of such information systems. By establishing viable software industries that will respond to the needs of the local market place and by computer-assisted learning at the industrial level UNIDO promotes and expands the use of informatics in industry.

48. There cannot be networks without communication inputs. In that respect, everything that ITU can do to improve the state of communications in the developing countries or that it can obtain by way of facilities for exchanges will be of advantage to informatics.

49. UNESCO and ITU have cooperated for several years in their various domains of interest, without any formal agreement governing this cooperation. However, it was recently felt that the time had come for a formal agreement in order to ensure better coordination of programmes and projects concerned with telecommunications, communication and informatics, in order to avoid duplication of effort in these areas and to combine the human resources of both organizations for project identification, planning and execution. Preliminary negotiations between the UNESCO and ITU secretariats resulted in the elaboration of a draft agreement which was examined by the ITU Administrative Board at its meeting held from 27 May to 7 June 1991 and will be submitted to the UNESCO Executive Board at its 137th session, in October 1991. Such an agreement may go some way towards satisfying the Economic and Social Council resolution.

50. In addition, UNESCO initiated consultations with both ITU and UNIDO during the third session of the Intergovernmental Informatics Programme, in November 1990, to which those two organizations, as well as the United Nations University had been invited. It was felt within UNESCO, however, that a more

formal mechanism was needed to provide a framework for and give real impetus to cooperation in the field of informatics within the United Nations system, and that such a mechanism could be established under the aegis of the Administrative Committee on Coordination (ACC). This approach was submitted for consideration to the UNESCO Executive Board, which adopted the decision set out below at its 136th session (May-June 1991). The Economic and Social Council may wish to endorse the decision.

The Executive Board,

Having noted resolution 1990/58 adopted by the Economic and Social Council at its second regular session of 1990 in respect of international cooperation in the field of informatics,

Reaffirming the importance of the development of informatics as an instrument for international cooperation,

1. Invites the Director-General to continue to strengthen informatics activities and the Intergovernmental Informatics Programme (IIP);

2. Requests member States to give active support to informatics activities at the national level and step up their participation in international collaboration in this domain, particularly by making generous voluntary contributions to IIP;

3. Recommends the setting up of a coordinating mechanism comprising UNESCO, ITU and UNIDO for the purpose of regular consultation and coordination on informatics matters within the United Nations system.

Appendix

PROJECTS APPROVED IN 1991 DURING THE FIFTH SESSION OF THE BUREAU OF THE INTERGOVERNMENTAL INFORMATICS PROGRAMME

Africa	
Uganda	Sensitization and training in informatics of decision makers, informatics specialists and trainers.
Senegal	Centre for software production and preparatory training of graduates.
Latin America and the Caribbean	
Argentina	Information network on educational software: second phase.
Chile	Establishment of a centre for technology transfer in knowledge engineering.
Colombia	Development of a migration method from 3rd to 4th or 5th system generation.
Cuba	Centre of training of teachers and specialists in informatics for industry.
	Regional training centre in informatics for teaching and research in engineering and architecture: second phase.
Ecuador	Training of Ecuadorian civil servants in informatics.
	Conference of Latin American authorities in informatics (CALAI).
Uruguay	Al Sur: Multimedia centre for scientific and technological resources.
Asia and the Pacific	
China	Renovation of the Beijing Microcomputer Centre.
Indonesia	Software production for computer and technology teaching.
Iran, Islamic Republic of	Implementation of a computer centre at Mashad University of medical sciences and postgraduate activities.

New Zealand	Regional Informatics Network for South East Asia and the Pacific: design phase.
Sri Lanka	Strengthening of a microcomputer laboratory for the University of Colombo.